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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/802,681	WATANABE, KAZUYO	
	Examiner	Art Unit	
	David P. Rashid	2624	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *2-11 and 13-19* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *2-11 and 13-19* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

All of the examiner's suggestions presented herein below have been assumed for examination purposes, unless otherwise noted.

Amendments

1. This office action is responsive to the claim and specification amendment received on 7/25/2007. **Claims 2 – 11** and **13 – 19** remain pending; **claims 1** and **12** are cancelled; **claims 18 – 19** are new.

Drawings

2. The replacement drawings were received on 7/25/2007 and are acceptable. In response to applicant's drawing amendments and remarks, the previous drawing objections are withdrawn.

Specification

3. In response to applicant's specification amendments and remarks received on 7/25/2007, the previous specification objections are withdrawn.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. **Claims 2 – 3** and **11** are rejected under 35 U.S.C. 103(a) as being unpatentable over Matsushima (US 2003/0099407 A1) in view of Tsuchiya et al. (JP 2000-134467). A machine English translation of Tsuchiya has been provided in the previous Office Action.

Regarding **claim 2**, while Matsushima discloses an image processing method of making luminance correction on the basis of a luminance histogram showing distribution of a luminance level of image data in which an image is expressed by a numerical value ("The present invention generally relates to image correction processes, and more particularly to a contrast correction process and a gradation correction process of a digital image.", paragraph [0002]), comprising the steps of:

obtaining a luminance average value in said luminance histogram, a luminance standard deviation indicative of a degree of dispersion of luminance distribution from the luminance average value ("It should be noted that N is a total number of pixels, Y(j) is a luminance of the "j"th pixel, and the sum .SIGMA. is obtained from j=1 through N. In addition, ave(Y(j)) is an average value of Y(j), and S(Y(j)) is a standard deviation of Y(j).", paragraph [0084] when defining the degree of distortion function Z in equation 3 to be later used in the algorithm at step S52, FIG. 7), and a peak distance showing a distance between peaks in the luminance histogram (FIG. 11 is an image showing a distance between peaks in a luminance histogram);

comparing a distribution discrimination value which can discriminate whether a distribution deviation of the luminance level exists on a low luminance side or a high luminance side in the luminance histogram or not with the obtained peak distance ("When Z>0, the luminance histogram is in a shape having the peak at a low luminance level as shown in FIG. 12. Accordingly, the type determination part 25 of the determination part 2 determines whether or

not the calculated degree of distortion is greater than 0 in step S52 in FIG. 7. When the condition Z>0 is satisfied, the type of the input image is determined as the type A in step S56 in FIG. 7. Further, the input image may be determined as the type A when a threshold value other than 0 is set and the degree of distortion Z is greater than the threshold value.", paragraph [0085] wherein the distribution discrimination value is the value 0. When comparing to the Z function, it can be determined if the distribution deviation of the luminance level exists on a low luminance side or a high luminance side in the luminance histogram.), comparing a halftone presence/absence discrimination value which can discriminate whether the distribution deviation of the luminance levels does not exist in a halftone in said luminance histogram or not with the obtained standard deviation, thereby discriminating whether the image is a backlight image or not on the basis of results of the comparisons ("First, a description will be given of the measuring part 21. As described above, in many cases, the histogram of the image determined as the type A has unbalanced distribution. Especially, in an image photographed against light, it is often the case that an object is extremely dark and the background is extremely bright. In such a case, the luminance histogram is polarized as shown in FIG. 8. The measuring part 21 measures the polarization level of the luminance histogram using the frequency and slope of the luminance histogram. FIG. 9 shows the process flow of the measuring part 21.", paragraph [0074] wherein type A is defined as "An image photographed against light, a portrait image photographed at night and the like are determined as the type A, for example.", paragraph [0072] which is a backlight image. Backlight images (type A) according to the disclosed invention are considered polarized which can be measured by the algorithm given in FIG. 9.

"A description will be given of a process in a case where the luminance histogram has two poles, by referring to FIG. 11. Also in this case, the same process is performed as that of the case shown in FIG. 10 until the level X is detected. However, in the case where the luminance histogram has two poles, the slope h(i) sharply increases in a negative direction in an area where the frequency f(i) is less than the threshold value Th1. When h(i)=Th2 (Th2 is a threshold value)(Yes in step S23 in FIG. 9), the i is detected as a luminance level Y2 in step S35, and the process ends.", paragraph [0080] showing that the halftone presence discrimination value is Th1. A comparison with Th1 can show that an image is polarized, and if so, has at least two separate and distinct peaks with a distance between them from the luminance histogram.); and

comparing each of the luminance average value and the luminance standard deviation by using an exposing state discrimination value which can discriminate the exposing state, thereby discriminating an exposing state of an image other than the backlight image (The exposing state discrimination value is the same as the distribution discrimination value as above. The exposing state of the luminance histogram is also discriminated when determining the degree of distortion Z to value 0, Matsushima does not teach using a peak distance value which indicates a longest distance between peaks in said luminance histogram in the case where plural peaks exist, so that plural distances between respective peaks exist.

Tsuchiya discloses an image processing method (FIG. 4) that teaches using a peak distance value (the end of paragraph [0050] when the table group is rewritten (to remove low peaks) which constitutes a "value" indicating the longest distance between peaks) which indicates a longest distance between peaks in a luminance histogram in the case where plural

peaks exist (from FIG. 14 to FIG. 15 such that the middle peak in the luminance histogram is removed; paragraph [0050]), so that plural distances between respective peaks exist.

It would have been obvious to one of ordinary skill in the art at the time the invention was made for the peak distance of Matsushima to include a peak distance value which indicates a longest distance between peaks in said luminance histogram in the case where plural peaks exist, so that plural distances between respective peaks exist as taught by Tsuchiya "...to perform a suitable image processing according to an exposure.", Tsuchiya , paragraph [0015] and "...to perform the image processing which judged and carried out backlight scene ** of the image of a backlight scene.", Tsuchiya, paragraph [0016].

Regarding **claim 3**, while Matsushima in view of Tsuchiya discloses the image processing method according to claim 2, Matsushima in view of Tsuchiya does not teach wherein the image process, luminance correction according to backlight process to the backlight image, an under-exposure process to an under-exposure image, an over-exposure process to an over-exposure image, and a standard exposure process to a standard exposure image is made in accordance with the exposing state of the image.

Tsuchiya discloses an image process method ("Exposure judging processing of an image and exposure amendment processing according to a judgment result are performed using the brightness histogram for which it asked above.", paragraph [0039] in combination with the method given in drawing 9) that teaches wherein the image process, luminance correction according to backlight process to the backlight image, an under-exposure process to an under-exposure image, an over-exposure process to an over-exposure image, and a standard exposure process is made in accordance with the exposing state of the image (Refer to references cited in

claim 1 wherein the exposing state value is I1. Drawing 9 discloses using the exposing state (average value of the histogram I1) to lead to four possibilities in determining the exposing state. "Exposure judging processing of this operation gestalt can classify an input image into the exposure S11 of others, such as overexposure S8, the exposure undershirt S10, standard exposure S9, and a backlight.", paragraph [0054].).

It would have been obvious to one of ordinary skill in the art at the time the invention was made for the method of Matsushima in view of Tsuchiya to perform wherein an image process, luminance correction according to backlight process to the backlight image, an under-exposure process to an under-exposure image, an over-exposure process to an over-exposure image, and a standard exposure process is made in accordance with the exposing state of the image of Tsuchiya as suggested by Tsuchiya "...to perform a suitable image processing according to an exposure.", Tsuchiya , paragraph [0015].

Regarding **claim 11**, Matsushima discloses the image processing method according to claim 2, wherein if it is determined that the image data is a part of a series of image data constructed by a plurality of data, the image process is executed to the image data obtained by collecting a series of image data (The image data is always part of a series of image data constructed by a plurality of data since if the image is more than one pixel, the series of image data constructed by a plurality of data is the array of pixels itself in the image. Since this is true in every case (unless the image is only one pixel), the image processing method as disclosed by Matsushima is executed to the image data (the array of pixels) by collecting a series of image data (any data produced from the image processing method.).

6. **Claims 4 – 9** and **15 – 17** are rejected under 35 U.S.C. 103(a) as being unpatentable over Matsushima (US 2003/0099407 A1) in view of Tsuchiya et al. (JP 2000-134467) and Maruoka et al. (US 2003/0002736 A1).

Regarding **claim 4**, while Matsushima in view of Tsuchiya discloses the image processing method according to claim 2, Matsushima in view of Tsuchiya does not teach wherein in the under-exposure process, in a histogram of the under-exposure image, the histogram is stretched in accordance with the histogram of the under-exposure image so as to shift the luminance average value existing on the low luminance side toward a predetermined value of the histogram.

Maruoka teaches an automatic tone correction apparatus ("...an improved digital image processing apparatus that can correct an input image, more specifically, that can automatically correct tones of an input image.", paragraph [0001]) wherein in an under-exposure process, in a histogram of an under-exposure image, the histogram is stretched in accordance with the histogram of the under-exposure image so as to shift the luminance average value existing on the low luminance side toward a predetermined value of the histogram (An example of this histogram is shown in FIG. 40(a). Next, assuming that the minimum density value of the created density histogram is dmin, the maximum density value is dmax, the number of pixels having a pixel density d is F1[d], and the number of pixels after conversion is F2[d], a histogram which is corrected so as to expand a pixel density distribution area over the whole pixel luminance (refer to FIG. 40(b)) is formed according to formula (1) as follows and, simultaneously, a point (center of gravity) G which divides the area of the histogram into two equal parts is calculated.", paragraph [0004] wherein FIG. 40(a) and FIG. 40(b) show the disclosed algorithm stretching the

luminance histogram of an under-exposure image and the predetermined value is the target value. Since the histogram as a whole is shifted toward the target value, the luminance average (center of gravity) will naturally shift in that same direction. The target value is given in equation (7), page 11.).

It would have been obvious to one of ordinary skill in the art at the time the invention was made for the image processing method of Matsushima in view of Tsuchiya to disclose wherein in an under-exposure process, in a histogram of an under-exposure image, the histogram is stretched in accordance with the histogram of the under-exposure image so as to shift the luminance average value existing on the low luminance side toward a predetermined value of the histogram as taught by Maruoka "...that optimizes the shape of the histogram.", Maruoka , paragraph [0002].

Regarding **claim 5**, while Matsushima in view of Tsuchiya disclose the image processing method according to claim 3, Matsushima in view of Tsuchiya does not teach wherein in the over-exposure process, in a histogram of the over-exposure image, the histogram is stretched in accordance with the histogram of the over-exposure image so as to shift the luminance average value existing on the high luminance side toward a predetermined value of the histogram.

Maruoka teaches an automatic tone correction apparatus ("In this fifth embodiment, the target value is corrected.", paragraph [0313]) wherein in an over-exposure process, in a histogram of the over-exposure image, the histogram is stretched in accordance with the histogram of the over-exposure image so as to shift the luminance average value existing on the high luminance side toward a predetermined value of the histogram ("With reference to FIG. 38(a), since the peak position of the target luminance distribution exists on the lower-luminance

side than the peak position of the distribution of the luminance histogram, the target value is on the lower-luminance side than the center of gravity. Accordingly, in FIG. 38(b), the luminance histogram is corrected so that the center of gravity matches the target value that is smaller than the center of gravity, whereby the contrast is improved, but the image is darkly corrected. However, in FIG. 38(c), since the target value is corrected to the center of gravity, the contrast is improved while maintaining the original brightness.", paragraph [0325] wherein the predetermined value is the target value. Since the histogram as a whole is shifted toward the target value, the luminance average (center of gravity) will naturally shift in that same direction. The target value is given in equation (7), page 11.).

It would have been obvious to one of ordinary skill in the art at the time the invention was made for the image processing method of Matsushima in view of Tsuchiya to disclose wherein in an over-exposure process, in a histogram of the over-exposure image, the histogram is stretched in accordance with the histogram of the over-exposure image so as to shift the luminance average value existing on the high luminance side toward a predetermined value of the histogram as taught by Maruoka "...that optimizes the shape of the histogram.", Maruoka , paragraph [0002].

Regarding **claim 6**, while Matsushima in view of Tsuchiya disclose the image processing method according to claim 3, Matsushima in view of Tsuchiya does not teach wherein in the standard exposure process, in a histogram of the standard exposure image, the luminance average value is shifted toward a predetermined value in accordance with the histogram.

Maruoka teaches an automatic tone correction apparatus ("In this first embodiment, the whole luminance distribution of a luminance histogram is expanded over all tones to improve the

contrast of an input image as a whole, and simultaneously, the luminance histogram is corrected so that the center of gravity of a low-luminance part of the histogram is shifted to a target value.", paragraph [0124]) wherein in the standard exposure process, in a histogram of the standard exposure image, the luminance average value is shifted toward a predetermined value in accordance with the histogram ("In this case, since tone correction is carried out so that the center of gravity of the low-luminance part of the luminance distribution which is corrected by formula (5) matches the target value, when the center of gravity calculated by the center-of-gravity calculation circuit 105 is indicated by G and the target value stored in the target value storage circuit 107 is indicated by g, a .gamma. value that satisfies the following formula (7) should be calculated. 4 g = 255 .times. ((G - Y min) / (Y max - Y min)) 1 (7)", paragraph [0142] wherein the luminance average value (center of gravity) is shifted toward a predetermined value g (target value).).

It would have been obvious to one of ordinary skill in the art at the time the invention was made for the image processing method of Matsushima in view of Tsuchiya to disclose wherein in an over-exposure process, in a histogram of the over-exposure image, the histogram is stretched in accordance with the histogram of the over-exposure image so as to shift the luminance average value existing on the high luminance side toward a predetermined value of the histogram as taught by Maruoka "...that optimizes the shape of the histogram.", Maruoka , paragraph [0002].

Regarding **claim 7**, while Matsushima in view of Tsuchiya disclose the image processing method according to claim 3, Matsushima in view of Tsuchiya does not teach wherein in the backlight process, a histogram of the backlight image is divided into halves, the histogram on the

low luminance side is stretched in accordance with the histogram of the backlight image so as to shift the luminance average value existing on the low luminance side toward a predetermined value, and the histogram on the high luminance side is stretched in accordance with the histogram of the backlight image so as to shift the luminance average value existing on the high luminance side toward the predetermined value.

Maruoka teaches an automatic tone correction apparatus ("In this fourth embodiment, a boundary of a low-luminance part and a high-luminance part is detected on the basis of the shape of a luminance histogram.", paragraph [0272]) wherein in a backlight process, a histogram of the backlight image is divided into halves, the histogram on a low luminance side is stretched in accordance with the histogram of the backlight image so as to shift the luminance average value existing on the low luminance side toward a predetermined value, and the histogram on the high luminance side is stretched in accordance with the histogram of the backlight image so as to shift the luminance average value existing on the high luminance side toward a predetermined value ("FIG. 30(a) is a luminance histogram of an image in the back-lighted state. In this state, two peaks of mountain-shape distributions are generated on the low-luminance side and the high-luminance side, and the range A of the peak (mountain-shape distribution) on the low-luminance side and the range B of the peak on the high-luminance side are detected, and the boundary value is positioned at the "valley" of the two mountain-shape distributions.", paragraph [0280] in combination with "FIGS. 31(a)-31(c) illustrate the correction process for the back-lighted image shown in FIG. 30(a), and FIGS. 32(a)-32(c) illustrate the correction process for the forward-lighted image shown in FIG. 30(b). More specifically, FIGS. 31(a) and 32(a) illustrate the target value calculating process by the target value calculation circuit 1508, FIGS. 31(b) and 32(b)

illustrate the center-of-gravity calculating process by the center-of-gravity calculation circuit 1506, and FIGS. 31(c) and 32(c) illustrate the correcting process by the image signal correction circuit 1510. It is assumed that a luminance distribution having a normal distribution shape is stored in the target luminance distribution storage circuit 1505.", paragraph [0284].).

It would have been obvious to one of ordinary skill in the art at the time the invention was made for the image processing method of Matsushima in view of Tsuchiya to disclose wherein in the backlight process, a histogram of the backlight image is divided into halves, the histogram on said low luminance side is stretched in accordance with the histogram of the backlight image so as to shift the luminance average value existing on the low luminance side toward a predetermined value, and the histogram on the high luminance side is stretched in accordance with the histogram of the backlight image so as to shift the luminance average value existing on the high luminance side toward said predetermined value as taught by Maruoka "...that optimizes the shape of the histogram.", Maruoka , paragraph [0002].

Regarding **claim 8**, while Matsushima in view of Tsuchiya and Maruoka disclose the image processing method according to claim 6, Matsushima in view of Tsuchiya and Maruoka does not disclose wherein in the backlight process, contacts where the histogram on the low luminance side and the histogram on the high luminance side have been respectively stretched are smoothly shown by using a three-dimensional function.

Tsuchiya discloses an image process method ("Exposure judging processing of an image and exposure amendment processing according to a judgment result are performed using the brightness histogram for which it asked above.", paragraph [0039] in combination with the method given in drawing 9) that teaches wherein in a backlight process, contacts where the

histogram on a low luminance side and the histogram on the high luminance a have been respectively stretched are smoothly shown by using a three-dimensional function ("Moreover, although the gradation curve of two break points was used with the 1st operation gestalt like LUT shown in drawing 7 as a gradation curve, it is possible to mitigate computational complexity by using the gradation curve of one break point still like LUT of drawing 6 in simple. Or when a smooth change of halftone is required, it is possible to be with approximation curves, such as a SHUPU line curve, and to connect a gradation curve smoothly.", paragraph [0108] where SHUPU line curve has been assumed to be the machine-translation of a "spline curve" as supported in the US patent application Yamazoe et al. US 6,694,051 B1 from which has claimed foreign priority to Tsuchiya as follows: "Though a gradation curve which has two folded points like an LUT shown in FIG. 15 is used in the fifth embodiment, a gradation curve which has one folded point like an LUT shown in FIG. 14 may conveniently used to reduce a calculation amount. When a smooth variation having an intermediate tone is required, it is possible to connect gradation curves smoothly using an approximate curve such as a spline curve.", column 20, line 36. It is well known to one of ordinary skill in the art that a common spline curve is a natural cubic spline.).

It would have been obvious to one of ordinary skill in the art at the time the invention was made for the image processing method of Matsushima in view of Tsuchiya and Maruoka to disclose wherein in a backlight process, contacts where the histogram on a low luminance side and the histogram on a high luminance side have been respectively stretched are smoothly shown by using a three-dimensional function as taught by Tsuchiya to work and compute with less sample points in the histogram for better computation time.

Regarding **claim 9**, while Matsushima in view of Tsuchiya and Maruoka discloses the image processing method according to claim 4, Matsushima in view of Tsuchiya and Maruoka does not teach wherein said predetermined value is an intermediate value in the histogram.

Maruoka teaches an automatic tone correction apparatus ("...an improved digital image processing apparatus that can correct an input image, more specifically, that can automatically correct tones of an input image.", paragraph [0001]) wherein a predetermined value is an intermediate value in the histogram (As cited in claim 4, FIG. 40(a) and FIG. 40(b) show the disclosed algorithm stretching the luminance histogram of an under-exposure image and the predetermined value is the target value. The predetermined value (target value) is calculated from equation (7) as cited in claim 6. According to the equation, the target value must lie somewhere within the values 0 and 255 of the histogram – thus making it an intermediate value in the histogram with respective to the x-axis.).

It would have been obvious to one of ordinary skill in the art at the time the invention was made for the image processing method of Matsushima in view of Tsuchiya and Maruoka to disclose wherein the predetermined value is an intermediate value in the histogram as taught by Maruoka for setting a "...value to which the center of gravity of the low-luminance part of the luminance histogram should be shifted...", Maruoka, paragraph [0018].

Regarding **claim 10**, while Matsushima in view of Tsuchiya discloses the image processing method according to claim 2, Matsushima in view of Tsuchiya does not teach wherein prior to discriminating said exposing state, whether said image data is artificially formed image data or not is discriminated, and if it is determined that said image data is the artificially formed image data, the luminance correction is not made to said image data.

Maruoka teaches an automatic tone correction apparatus ("In this first embodiment, the whole luminance distribution of a luminance histogram is expanded over all tones to improve the contrast of an input image as a whole, and simultaneously, the luminance histogram is corrected so that the center of gravity of a low-luminance part of the histogram is shifted to a target value.", paragraph [0124]) wherein prior to discriminating an exposing state, whether the image data is artificially formed image data or not is discriminated, and if it is determined that the image data is the artificially formed image data, the luminance correction is not made to the image data ("Further, when the luminance distribution formed by the luminance distribution formation circuit 104 is discrete, tone correction is not carried out (corresponding to claim 24). An example of luminance distribution in this case is shown in FIG. 9. When the luminance distribution is discrete, the input image can be judged as an artificial image, not a natural image. When an artificial image is inputted, it is better not to perform tone correction.", paragraph [0173]).

It would have been obvious to one of ordinary skill in the art at the time the invention was made for the image processing method of Matsushima in view of Tsuchiya to disclose wherein prior to discriminating an exposing state, whether the image data is artificially formed image data or not is discriminated, and if it is determined that the image data is the artificially formed image data, the luminance correction is not made to the image data as taught by Maruoka since "...the luminance distribution is discrete...", Maruoka, paragraph [0173].

Regarding **claim 15**, while Matsushima in view of Tsuchiya and Maruoka disclose the image processing method according to claim 5, Matsushima in view of Tsuchiya and Maruoka does not teach wherein the predetermined value is an intermediate value in the histogram.

Maruoka teaches an automatic tone correction apparatus ("...an improved digital image processing apparatus that can correct an input image, more specifically, that can automatically correct tones of an input image.", paragraph [0001]) wherein a predetermined value is an intermediate value in the histogram (The predetermined value is the same calculated target value as cited in claim 9. Refer to references cited in claim 9.).

It would have been obvious to one of ordinary skill in the art at the time the invention was made for the image processing method of Matsushima in view of Tsuchiya and Maruoka to disclose wherein the predetermined value is an intermediate value in the histogram as taught by Maruoka for setting a "...value to which the center of gravity of the low-luminance part of the luminance histogram should be shifted...", paragraph [0018].

Regarding **claim 16**, while Matsushima in view of Tsuchiya and Maruoka disclose the image processing method according to claim 6, Matsushima in view of Tsuchiya and Maruoka does not teach wherein the predetermined value is an intermediate value in the histogram.

Maruoka teaches an automatic tone correction apparatus ("...an improved digital image processing apparatus that can correct an input image, more specifically, that can automatically correct tones of an input image.", paragraph [0001]) wherein a predetermined value is an intermediate value in the histogram (The predetermined value is the same calculated target value as cited in claim 9. Refer to references cited in claim 9.).

It would have been obvious to one of ordinary skill in the art at the time the invention was made for the image processing method of the combination between Matsushima, Tsuchiya, and Maruoka to disclose wherein the predetermined value is an intermediate value in the

histogram as taught by Maruoka for setting a "...value to which the center of gravity of the low-luminance part of the luminance histogram should be shifted...", paragraph [0018].

Regarding **claim 17**, while Matsushima in view of Tsuchiya and Maruoka disclose the image processing method according to claim 7, Matsushima in view of Tsuchiya and Maruoka does not teach wherein the predetermined value is an intermediate value in the histogram.

Maruoka teaches an automatic tone correction apparatus ("...an improved digital image processing apparatus that can correct an input image, more specifically, that can automatically correct tones of an input image.", paragraph [0001]) wherein a predetermined value is an intermediate value in the histogram (The predetermined value is the same calculated target value as cited in claim 9. Refer to references cited in claim 9.).

It would have been obvious to one of ordinary skill in the art at the time the invention was made for the image processing method of Matsushima in view of Tsuchiya and Maruoka to disclose wherein the predetermined value is an intermediate value in the histogram as taught by Maruoka for setting a "...value to which the center of gravity of the low-luminance part of the luminance histogram should be shifted...", paragraph [0018].

7. **Claim 13** is rejected under 35 U.S.C. 103(a) as being unpatentable over Matsushima (US 2003/0099407 A1) in view of Tsuchiya et al. (JP 2000-134467), Ma (US 6,371,373 B1), and Maruoka et al. (US 2003/0002736 A1).

Regarding **claim 13**, while Matsushima in view of Tsuchiya and Ma discloses the image processing apparatus according to claim 19, Matsushima in view of Tsuchiya and Ma does not teach further comprising an artificial image discriminating unit which discriminates whether the

image data is artificially formed image data or not prior to the discrimination of a exposure discriminating unit, and wherein when it is determined by the artificial image discriminating unit that the image data is the artificially formed image data, the correction processing unit does not make the luminance correction to the image data.

Maruoka teaches an automatic tone correction apparatus ("In this first embodiment, the whole luminance distribution of a luminance histogram is expanded over all tones to improve the contrast of an input image as a whole, and simultaneously, the luminance histogram is corrected so that the center of gravity of a low-luminance part of the histogram is shifted to a target value.", paragraph [0124]) further comprising an artificial image discriminating unit which discriminates whether the image data is artificially formed image data or not prior to the discrimination of a exposure discriminating unit, and wherein when it is determined by the artificial image discriminating unit that the image data is the artificially formed image data, the correction processing unit does not make the luminance correction to the image data ("Further, when the luminance distribution formed by the luminance distribution formation circuit 104 is discrete, tone correction is not carried out (corresponding to claim 24). An example of luminance distribution in this case is shown in FIG. 9. When the luminance distribution is discrete, the input image can be judged as an artificial image, not a natural image. When an artificial image is inputted, it is better not to perform tone correction.", paragraph [0173]).

It would have been obvious to one of ordinary skill in the art at the time the invention was made for the image processing apparatus of Matsushima in view of Tsuchiya and Ma to disclose further comprising an artificial image discriminating unit which discriminates whether the image data is artificially formed image data or not prior to the discrimination of a exposure

discriminating unit, and wherein when it is determined by the artificial image discriminating unit that the image data is the artificially formed image data, the correction processing unit does not make the luminance correction to the image data as taught by Maruoka since "...the luminance distribution is discrete...", paragraph [0173].

8. **Claims 14** and **18 – 19** are rejected under 35 U.S.C. 103(a) as being unpatentable over Matsushima (US 2003/0099407 A1) in view of Tsuchiya et al. (JP 2000-134467) and Ma (US 6,371,373 B1).

Regarding **claim 14**, Matsushima discloses further comprising a same image discriminating unit which discriminates whether the image data is a series of image data constructed by a plurality of data or not,.and wherein if the same image discriminating unit determines that the image data is same banded image data, the image process is executed to the image data obtained by collecting a series of image data (The image data is always part of a series of image data constructed by a plurality of data since if the image is more than one pixel, the series of image data constructed by a plurality of data is the array of pixels itself in the image. Since this is true in every case (unless the image is only one pixel), the image processing method as disclosed by Matsushima is executed to the image data (the array of pixels) by collecting a series of image data (any data produced from the image processing method.).

Regarding **claim 18**, claim 19 recites identical features as in claim 18. Thus, references/arguments equivalent to those presented below for claim 19 are equally applicable to claim 18 where the "luminance deviation" is the "luminance standard deviation".

Regarding **claim 19**, Matsushima discloses an image processing apparatus for discriminating an exposure state of image data on the basis of a luminance histogram which indicates a distribution of luminance level of the image data and is generated from the image data ("The present invention generally relates to image correction processes, and more particularly to a contrast correction process and a gradation correction process of a digital image.", paragraph [0002]), said apparatus comprising:

a luminance standard deviation obtaining unit which obtains a luminance standard deviation indicative of a degree of dispersion of luminance distribution from the luminance average value in the luminance histogram ("It should be noted that N is a total number of pixels, Y(j) is a luminance of the "j"th pixel, and the sum .SIGMA. is obtained from j=1 through N. In addition, ave(Y(j)) is an average value of Y(j), and S(Y(j)) is a standard deviation of Y(j).", paragraph [0084] when defining the degree of distortion function Z in equation 3 to be later used in the algorithm at step S52, FIG. 7. The obtaining unit itself would be the computer algorithm implemented to perform the Z function calculation: "Accordingly, a general object of the present invention is to provide an improved and useful image processing apparatus, image processing method, computer program, and a computer-readable storage medium in which the above-mentioned problems are eliminated.", paragraph [0018].); and

an exposure discriminating unit which discriminates whether the image is a backlight image or not on the basis of results of the comparisons when the luminance deviation value is greater than or equal to a first predetermined value (refer to references/arguments cited in claim 2).

Tsuchiya discloses an image processing apparatus for discriminating an exposure state of image data on the basis of a luminance histogram (FIG. 14) which indicates a distribution of luminance level of the image data and is generated from the image data (FIG. 4), said apparatus comprising:

a peak distance obtaining unit which detects one or more peaks from the luminance histograms (FIG. 14; "Th_f" in FIG. 14; paragraph [0045]; FIG. 12, element S42); and

an exposure discriminating unit which calculates a peak distance value (both "HL" and "SD" in FIG. 4, element S13 that "indicate" the longest distance between peaks) which indicates the longest distance between peaks in the case that plural peaks exist so that plural distances between respective peaks exists; and discriminates whether the image is a backlight image or not (FIG. 4, elements S9, S11, S13) on the basis of results of the comparisons when the peak distance value ("(HL – SD) > 160" in FIG. 4, element S13) is greater than or equal to a second predetermined value ("160" in FIG. 4, element S13).

Ma discloses a method for reading a two-dimensional barcode (FIG. 1) that teaches finding a more relevant peak distance value (FIG. 3, element 175) which indicates the longest distance between peaks (FIG. 3, elements 155, 165); and discriminates on the basis of results of the comparisons when the peak distance value is greater than or equal to a second predetermined value (Col. 6, lines 27 – 63).

It would have been obvious to one of ordinary skill in the art at the time the invention was made for the shadow point "SD" and highlight point "HL" of Tsuchiya to be the actual peak points as taught by Ma to use actual peak points of the luminance histogram based off of

maximum luminance values as opposed to frequency/percentage of luminance values, another way of solving the same problem.

All of the component parts are known in Matsushima and Tsuchiya in view of Ma. The only difference is the combination into a single back-light determinator by incorporating them into a single algorithm.

Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the back-light determination using peak-distance values/thresholds as taught by Tsuchiya in view of Ma into the algorithm of back-light determination using standard deviation values/thresholds as taught by Matsushima, since back-light determination using peak-distance values/threshold is in no way dependent on an algorithm that uses standard deviation values/thresholds to determine back-lights, and a peak-distance values/threshold algorithm can be used in combination with a standard deviation values/thresholds algorithm to achieve predictable results of determining whether an image is back-light or not.

Response to Arguments

9. Applicant's arguments filed on 7/25/2007 with respect to **2 – 11** and **13 – 19** have been respectfully and fully considered, but they are not found persuasive.

10. **Summary of Remarks** regarding **claim 18**:

Applicant argues that Tsuchiya does not disclose, teach or suggest calculating a peak distance value which indicates the longest distance between peaks and determining that the image is backlit based on the peak distance value (@ *response page 10*), thus placing claim 18 in condition for allowance.

11. Examiner's Response regarding **claim 18**:

Tsuchiya does suggest calculating a peak distance value (the updated string of numbers after being rewritten as disclosed in paragraph [0050] from which the middle peak "B" in FIG. 14 is not considered in FIG. 15, leaving the longest distance between peaks and the updated string of numbers being considered a "value".

Though Tsuchiya uses shadow point "SD" and highlight point "HL" that are based off of percentage/frequency of luminance values in FIG. 4, element S13 when compared to predetermined threshold "160", it would have been obvious to one of ordinary skill in the art at the time the invention was made for the shadow point "SD" and highlight point "HL" of Tsuchiya to be the actual peak points as taught by Ma (US 6,371,373 B1) to use actual peak points of the luminance histogram based off of maximum luminance values as opposed to frequency/percentage of luminance values, another way of solving the same problem.

12. **Summary of Remarks** regarding **claims 2** and **11**:

(i) Applicant argues that Matsushima does not disclose, teach or suggest calculating a peak distance value which indicates the longest distance between peaks and determining that the image is backlit based on the peak distance value (@ *response page 11*), thus placing claim 2 in condition for allowance.

(ii) Since claim 2 has been shown to be allowable, claim 11 is dependent on claim 2 and is allowable at least by its dependency (*@ response page 11*).

13. Examiner's Response regarding **claims 2** and **11**:

(i) Though Matsushima does not directly disclose calculating a peak distance value which indicates the longest distance between peaks and determining that the image is backlit based on the peak distance value, Tsuchiya discloses an image processing method (FIG. 4) that teaches using a peak distance value (the end of paragraph [0050] when the table group is rewritten (to remove low peaks) which constitutes a "value" indicating the longest distance between peaks) which indicates a longest distance between peaks in a luminance histogram in the case where plural peaks exist (from FIG. 14 to FIG. 15 such that the middle peak in the luminance histogram is removed; paragraph [0050]), so that plural distances between respective peaks exist. It would have been obvious to one of ordinary skill in the art at the time the invention was made for the peak distance of Matsushima to include a peak distance value which indicates a longest distance between peaks in said luminance histogram in the case where plural peaks exist, so that plural distances between respective peaks exist as taught by Tsuchiya "...to perform a suitable image processing according to an exposure.", Tsuchiya , paragraph [0015] and "...to perform the image processing which judged and carried out backlight scene ** of the image of a backlight scene.", Tsuchiya, paragraph [0016].

(ii) Since claim 2 has been shown to be anticipated by Matsushima in view of Tsuchiya, claim 11 is dependent on claim 2 and is not allowable at least by its dependency.

14. **Summary of Remarks** regarding **claims 3 – 11** and **15 – 17**:

Applicant argues that the references (Matsushima, Tsuchiya, and Maruoka) anticipating claim 3 (@ *response page 12*); claims 4, 9, and 10 (@ *response page 12*); and claims 5 – 8 and 15 – 17 (@ *response page 12*) all do not clear up the Matsushima deficiency, and since claim 2 has been shown to be allowable, claims 3 – 11 and 15 – 17 are dependent on claim 2 and are allowable at least by their dependency (@ *response page 13*).

15. Examiner's Response regarding **claims 13 – 14** and **19**:

As shown above, Matsushima in view of Tsuchiya clears up the Matsushima deficiency. Since claim 2 has been shown to be anticipated by Matsushima in view of Tsuchiya, claims 3 – 11 and 15 – 17 are dependent on claim 2 and are not allowable at least by their dependency.

16. **Summary of Remarks** regarding **claims 13 – 14** and **19**:

(i) Applicant argues that neither Matsushima nor Lee et al. teach or suggest a peak distance obtaining unit which detects one or more peaks from the luminance histogram; and an exposure discriminating unit which calculates a peak distance value which indicates the longest distance between peaks in the case that plural peaks exist so that plural distances between respective peaks exist; and discriminates that the image is a backlight image when the luminance deviation value is greater than or equal to a first predetermined value and the peak distance value is greater than or equal to a second predetermined value, as recited by new claim 19 (@ *response page 13*).

(ii) Since claim 19 has been shown to be allowable, claims 13 – 14 are dependent on claim 19 and are allowable at least by their dependency (@ *response page 14*).

17. Examiner's Response regarding **claims 13 – 14** and **19**:

(i) As shown above in Section 11, Matsushima in view of Tsuchiya and Ma teach a peak distance obtaining unit which detects one or more peaks from the luminance histogram; and an exposure discriminating unit which calculates a peak distance value which indicates the longest distance between peaks in the case that plural peaks exist so that plural distances between respective peaks exist; and discriminates that the image is a backlight image when the luminance deviation value is greater than or equal to a first predetermined value and the peak distance value is greater than or equal to a second predetermined value.

Tsuchiya does suggest calculating a peak distance value (the updated string of numbers after being rewritten as disclosed in paragraph [0050] from which the middle peak "B" in FIG. 14 is not considered in FIG. 15, leaving the longest distance between peaks and the updated string of numbers being considered a "value". Though Tsuchiya uses shadow point "SD" and highlight point "HL" that are based off of percentage/frequency of luminance values in FIG. 4, element S13 when compared to predetermined threshold "160", it would have been obvious to one of ordinary skill in the art at the time the invention was made for the shadow point "SD" and highlight point "HL" of Tsuchiya to be the actual peak points as taught by Ma (US 6,371,373 B1) to use actual peak points of the luminance histogram based off of maximum luminance values as opposed to frequency/percentage of luminance values, another way of solving the same problem.

(ii) Since claim 19 has been shown to be anticipated by Matsushima in view of Tsuchiya and Ma, claims 13 – 14 are dependent on claim 19 and are not allowable at least by their dependency.

Conclusion

18. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to David P. Rashid whose telephone number is (571) 270-1578. The examiner can normally be reached Monday - Friday 8:30 - 17:00 ET.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Brian Werner can be reached on (571) 272-7401. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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/David P. Rashid/
Examiner, Art Unit 2624

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